

### **REMARKS**

Claims 1-147 are now pending in the application. Claims 10, 56, 102 and 140 are amended herein. New Claims 148-156 are presented. The amendments to the claims contained herein are not narrowing amendments. Support for the new claims can be found throughout the drawings and specification. As such, no new matter is added. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

Applicants would like to thank the Examiner for courtesy extended during the interview on March 31, 2008.

### **REJECTION UNDER 35 U.S.C. § 103**

Claims 1-6, 8, 13, 19-21, 24-27, 29, 34, 40-43, 46-52, 54, 59, 65-67, 70-73, 75, 80, 86, 92-98, 100, 105, 111-113, 116-119, 121, 126, 132-135, 138, 140, and 143-145 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dacosta (U.S. Pub. No. 2004/0190528) in view of Edwards et al. (U.S. Pub. No. 2004/0059825). This rejection is respectfully traversed.

With respect to Claim 1, Dacosta and Edwards do not show, teach or suggest a link adaptation module that dynamically adjusts bandwidth by adjusting a number of channels based on a transmission error rate and a correlation measurement at a remote wireless communications device. The link adaptation module adjusts bandwidth at a transceiver based on a correlation measurement at a wireless communications device that is remote from that transceiver.

Example correlation measurements are disclosed throughout the present application and may include a rank of a channel matrix and an angle of array.

As best understood by Applicants, Dacosta discloses the allocation of bandwidth to provide a quality of service level. Dacosta states that network links that are known to have high packet error rates are allocated less bandwidth. Dacosta does not disclose a correlation measurement. Dacosta also does not disclose the transmission of a correlation measurement and the adjustment of bandwidth based thereon.

As further best understood by Applicants, Edwards discloses determining a quality of service assessment based on transmission power. In Edwards a signal is repeatedly transmitted and power is increased for each transmission until an acknowledgement signal is received. A quality assessment is based on the resultant power level.

Thus, at best the combination of Dacosta and Edwards discloses the allocation of bandwidth based on packet error rates and the packet error rates determined based on a transmitted power level. In contrast, the present invention adjusts bandwidth based on a transmission error rate and a correlation measurement at a receiver. This can be done without an increase or change in transmitted power, as described in the present application. Dacosta and Edwards do not at least disclose the correlation measurement.

The Examiner relies on IEEE 802.11 for disclosure of a correlation measurement. In so doing, the Examiner appears to admit that Dacosta does not disclose a correlation measurement, a correlation measurement at a receiver, the reception of a correlation

measurement at a transceiver that is remote from the receiver, and/or adjustment of bandwidth based on that correlation measurement.

In referring to IEEE 802.11, the Examiner states that it is inherent that a correlation measurement takes place in code-division multiple access (CDMA). The Examiner states that in spread spectrum communication, a correlation takes place to indicate that a proper signal is received at an expected time. The Examiner further states that the received signal is correlated with the expected spreading code to recover the information. Applicants submit that this is irrelevant. The determination that a signal is received at an expected time and the decoding/demultiplexing of CDMA signals does not suggest the adjustment of bandwidth based thereon. The reference to CDMA signals also does not suggest performing a correlation measurement at a receiver and adjusting bandwidth at a transceiver that is remote from that receiver based on the correlation measurement.

The Examiner asserts that despreading is necessary prior to adjusting a number of channels. This statement appears to be without foundation and at best an assumption on the part of the Examiner. The Examiner does not provide a reference that discloses this requirement or provide any reasons why despreading must be performed prior to a number of channels being adjusted. The Examiner also does not provide any reference that shows a relationship between despreading and the adjustment of a number of channels. Applicants are unable to find any reason in the relied upon references for this assertion. Applicants submit that channel adjustment may be performed independent of despreading. Besides, the despreading of CDMA signals at a receiver does not suggest the adjustment of bandwidth at a transmitter and

the relied upon references do not provide any relationship between despreading and bandwidth adjustment.

It is a longstanding rule that to establish a prima facie case of obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 143 (CCPA 1974), see MPEP §2143.03.

Therefore, Claim 1 is allowable for at least the above reasons. Claims 25, 47, 71, 93, and 117 are allowable for at least similar reasons as Claim 1. Claims 2-24, 26-46, 48-70, 72-92, 94-116 and 118-156 ultimately depend from Claims 1, 25, 47, 71, 93, and 117 and are allowable for at least similar reasons.

With respect to Claims 2 and 4, Dacosta and Edwards do not at least show teach or suggest the reception of a transmission error rate and/or a correlation measurement from a remote wireless communications device and the adjustment of bandwidth based on that reception.

Dacosta is silent with respect to how the packet error rates are known and/or determined. Thus, Dacosta does not disclose the determining of a transmission error rate at a receiver and the adjustment of bandwidth at a transmitter based on that transmission error rate. Dacosta also does not disclose a correlation measurement. Edwards simply discloses determining a quality of service assessment based on transmission power. Thus, Dacosta and Edwards fail to disclose the features of Claims 2 and 4.

Therefore Claims 2 and 4 are further allowable for at least the above reasons. Claims 48, 50, 94, and 96 are allowable for at least similar reasons.

With respect to Claim 139, Dacosta and Edwards do not at least show, teach or suggest adjusting bandwidth based on a detected operating environment selected from a rich-scattering environment and a line-of-sight environment.

The Examiner states that a MAC device in a MIMO system allocates bandwidth according to a rich-scattering environment. The Examiner does not provide a section in Dacosta or Edwards where this can be found. Applicants are unable to find any mention of a rich-scattering environment or a line-of-sight environment in the relied upon references. Applicants are also unable to find any mention or suggestion of adjusting bandwidth based on the detection of one of the recited operating environments.

Thus, Claim 139 is further allowable for at least the above reasons. Claims 144-147 and 154 are further allowable for at least similar reasons.

With respect to Claim 145, Dacosta and Edwards do not show, teach or suggest a MAC device that increases bandwidth of a wireless communication device when detecting a line-of-sight environment. A line-of-sight environment may be detected when a high transmission error rate exists. Thus, bandwidth is increased when a high transmission error rate exists.

In Dacosta bandwidth allocation is decreased when a high error rate exists. This is unlike the features of Claim 145. In Dacosta, network links that have a high error rate are penalized. In contrast, the invention of Claim 145 increases bandwidth to improve transmission.

Thus, Claim 145 is further allowable for at least the above reasons.

With respect to Claim 150, Dacosta and Edwards do not at least show, teach or suggest a link adaptation module that adjusts bandwidth for transmission of a space-time processed and multiplexed symbol sequence. Neither Dacosta nor Edwards disclose space-time processing and/or multiplexing. The Examiner has stated that Walton discloses space-time processing and appears to agree that Walton does not disclose bandwidth adjustment. The mere disclosure of space-time processing by Walton does not suggest the adjustment of bandwidth for the transmission of a space-time processed and multiplexed symbol sequence.

Therefore, Claim 150 is further allowable for at least the above reasons.

Claims 7, 9, 11, 12, 14-18, 22, 23, 28, 30, 32, 33, 35-38, 44, 45, 53, 55, 57, 58, 60-64, 68, 69, 74, 76, 78, 79, 81-85, 90, 91, 99, 101, 103, 104, 106-110, 114, 115, 120, 122, 124, 125, 127-131, 136, 137, 141, 142, 146, and 147 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dacosta in view of Edwards and further in view of Walton (U.S. Pub. No. 2005/0002468). This rejection is respectfully traversed.

With respect to Claim 7, Dacosta, Edwards and Walton do to at least disclose adjusting spatial multiplexing that is executed by a space-time processor. The Examiner admits that Dacosta and Edwards do not disclose this feature and relies on Walton for such disclosure. The term "spatial multiplexing" refers to a transmission technique that is used in MIMO wireless communication to transmit independent and separately encoded data signals, or streams, from each of multiple transmit antennas. The data signals are transmitted over parallel paths. The space dimension is reused or multiplexed more than one time. Bits of a data stream are multiplexed over multiple antennas. An increase in spatial multiplexing refers to an increase in the number of

parallel streams that can be transmitted based on the stated multiplexing. An example of spatial multiplexing is provided in paragraph [0006] of the present application. Spatial multiplexing may include the transmitting of different symbols of a symbol sequence over different antennas.

The Examiner refers to disclosure of spatial diversity and space-time processing in paragraphs 29, 30 and 60 of Walton. In paragraph 29, Walton simply states that different forms of spatial diversity may be provided via transmit and receive antennas. Spatial diversity simply refers to the spacing between antennas. The spacing between multiple antennas is clearly different than the multiplexing of data signals across multiple antennas and the adjustment of such multiplexing.

In paragraph 30, Walton appears to disclose that a system may operate in a diversity mode or a MIMO mode. In the diversity mode data is transmitted from all available antennas. In the MIMO mode data is transmitted and received from all antennas. Again, this does not imply or suggest an adjustment in spatial multiplexing. A system may have spatial diversity on a transmit end and/or a receive end and not use spatial multiplexing.

In paragraph 60, Walton discloses space-time processing of received signals. Applicants submit that this is irrelevant. The separating of received signals (transmitted signals on a received end) does not affect spatial multiplexing, which occurs on a transmit end. Walton is silent with regard to space-time processing on a transmit end and thus clearly does not disclose the adjustment of spatial multiplexing.

Thus, Dacosta, Edwards and Walton fail to disclose the stated features of Claim 7. Claim 7 is further allowable for at least the above reasons. Claims 14, 16, 17, 22,

28, 35, 37, 38, 44, 53, 60, 62, 63, 68, 74, 81, 83, 84, 90, 99, 106, 108, 109, 114, 120, 127, 129, 130, 141, 142, 146, 147, 151 and 152 are further allowable for at least similar reasons.

With respect to Claim 9, Dacosta, Edwards and Walton fail to at least disclose a correlation measurement that is a rank of a channel matrix of a MIMO wireless communications system. As known in the art, the rank of a matrix refers to the number of independent rows or columns of a matrix. A channel matrix may refer, for example, to a  $N \times M$  matrix that represents characteristics of a channel.

The Examiner relies on Walton for disclosure of the features of Claim 9 and refers to the ranking of SNR values in paragraph 61. The Examiner thus admits the failure of Dacosta and Edwards of disclosing a correlation measurement that is a rank of a channel matrix. Applicants submit that the ranking of SNR values for the selection of a post-processed signal with the highest SNR is clearly different than the rank of a matrix. Walton is silent with regard to the rank of a matrix. Walton does not disclose measurement, determination or use of the rank of a matrix. The rank of a matrix can not be found in Walton.

Thus, Dacosta, Edwards and Walton do not disclose adjusting bandwidth based on the rank of a matrix, as recited in Claim 9. Claim 9 is further allowable for at least the above reasons. Claims 30, 55, 76, 101, 122 and 153-155 are further allowable for at least similar reasons as Claim 9.



Claims 10, 31, 56, 77, 102, and 123 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dacosta in view of Edwards and further in view of Walton and further in view of Kitchener. This rejection is respectfully traversed.

With respect to Claim 10, Dacosta, Edwards, Walton and Kitchener do not at least disclose measurement, determination and/or use of an angle of array (AOA) of a signal for bandwidth adjustment.

The Examiner admits that Dacosta, Edwards and Walton do not disclose the features of Claim 10. The Examiner relies on Kitchener for such disclosure.

As best understood by Applicants, Kitchener simply discloses that the antenna spacing (spatial diversity) required depends upon the angle of arrival. This is irrelevant, since Claims 1 and 10 recite the adjustment of bandwidth based on the angle of arrival, not the adjustment of spatial diversity based on the angle of arrival.

In the Interview, the Examiner suggested that Kitchener discloses adjusting diversity based on AOA. The Examiner further states that the adjustment of diversity changes the quality of service and that Dacosta discloses the adjustment of bandwidth based on the quality of service.

Applicants submit that Kitchener is silent with respect to how an AOA is known or determined. Kitchener is thus also silent with regard to the adjusting of diversity based on the AOA. Kitchener simply states that spatial diversity depends on the AOA. Kitchener does not state that spatial diversity is adjusted during operation based on a detected AOA. Thus, Kitchener does not disclose the adjustment, as suggested by the Examiner.

Thus, the combination of Dacosta, Edwards, Walton and Kitchener do not teach a transceiver that adjusts bandwidth based on a detected AOA at a remote communications device.

Claim 10 is further allowable for at least the above reasons. Claims 31, 56, 77, 102 and 123 are allowable for at least similar reasons.


Also, at least with respect to Claims 1, 9 and 10, it appears that the Examiner is picking and choosing parts of references without considering what the references as a whole teach. The Applicants respectfully remind the Examiner that it is impermissible to pick and choose from a reference on so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what the reference fairly teaches to one skilled in the art. *Bausch & Lomb, Inc. v. Barnes-Hind, Inc.*, 230 USPQ 416 (Fed. Circ. 1986). The relied upon references as a whole and in combination clearly fail to disclose many of the features of Claims 1-156. Claims 1-156 are further allowable for at least this reason.

## CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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